TERRA

THE NATURAL HISTORY MUSEUM OF LOS ANGELES COUNTY
VOL. 26, NO. 1 • SEPTEMBER/OCTOBER 1987



Magnifications



Photographer Richard Ross sent us this picture of Godzilla offering ice cream to the statue of the short-faced bear in Hancock Park. Said Mr. Ross of his photograph: "I discovered on one trip to the park with a 9-inch toy model of Godzilla (built by myself and my son Tony, and embellished with an ice-cream cone) that by holding the model away from me at arm's length and then viewing it through a wide-angle camera lens, that Godzilla and the various massive statues appeared to be of equal size. The bear appeared to appreciate not only the company, but the offer of some cooling refreshment on a hot summer day."

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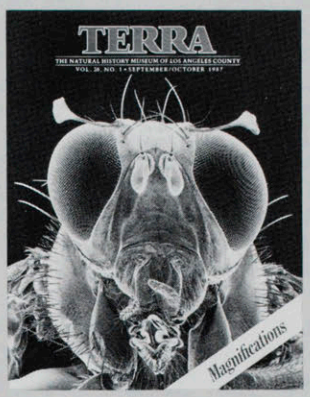
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TERRA

THE MEMBERS' MAGAZINE
OF THE NATURAL HISTORY MUSEUM
OF LOS ANGELES COUNTY
AND THE PAGE MUSEUM
OF LA BREA DISCOVERIES

VOL. 26, NO. 1 • SEPTEMBER/OCTOBER 1987



COVER: A close-up view (perhaps too close?) of a Mediterranean fruit fly, photographed by David Scharf. Mr. Scharf's vibrant scanning electron microscope images are featured in the museum's new exhibition Magnifications, on display in the Director's Gallery through January 11, 1988.

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David Scharf

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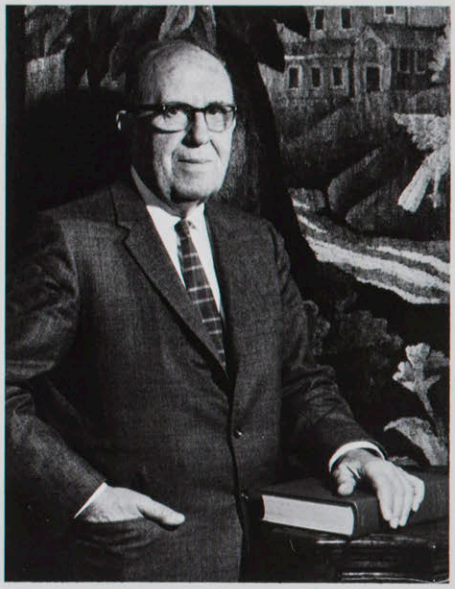
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MUSEUM ON THE MOVE



Dr. Herbert Friedmann, 1900–1987

In Memoriam: Dr. Herbert Friedmann. Dr. Herbert Friedmann, Director of the Natural History Museum of Los Angeles County from 1961 to 1970, died on May 13, 1987. Dr. Friedmann joined the Natural History Museum from his position as Curator of Ornithology at the Smithsonian Institution. In his nearly ten years as Director, Dr. Friedmann skillfully guided the institution to become the leading natural history museum in the West, abetting the enormous growth of its collections, curatorial staff, and the array and quality of public exhibitions.

He was born and educated in New York and was associated with research and teaching at several well-known universities in the area. For thirty years he worked at the Smithsonian Institution as Curator of Ornithology and later as Head Curator of Zoology.

Dr. Friedmann was the museum's sixth director. During his tenure at the Natural History Museum, the art museum moved to its new facilities on Wilshire Boulevard, leaving the museum with over twenty empty galleries. Dr. Friedmann worked to develop these galleries and expand the research and collections of the museum. Said Dr. Friedmann of this growth in a 1978 issue of TERRA: "Aside from new collections brought in through research and grant-supported field work, large collections came by transfer from other institutions. The growth is illustrated by the herpetology collection, which grew from 4,000 specimens to over 110,000, the fourth largest in the country. As a result, in the scientific world the Natural History Museum has become recognized as a high-grade, active center with a broad worldwide basis of interest and competence."

In 1970 Dr. Friedmann retired from the museum. This quiet, gracious, scholarly man with a wry sense of humor had provided a great impetus to progress and growth in exhibitions and research at the Natural History Museum.

In his sixty-year career Dr. Friedmann was equally well esteemed as an ornithologist and an art historian; he wrote more than 400 articles and thirteen books in these two fields. Dr. Friedmann's deep and abiding interest in our museum, ornithology, and art brought him back to the museum often.

The Herbert Friedmann Memorial Fund has been established to honor his memory through support of the new Great Bird Hall. Donations may be sent to the Friedmann Fund in care of the Natural History Museum Foundation, 900 Exposition Boulevard, Los Angeles, CA 90007.

1988 Dinosaur Ball: The Diamond Jubilee. Preparations are now being made for the 1988 Dinosaur Ball, the museum's major annual fundraiser and one of the most glamorous parties in Los Angeles. Alliance Board members Diana Jacobs and Elaine Leventhal will serve as Chairman and co-Chairman of the event.

Jacobs announced that the dinner and dance among the dinosaurs will be held on April 23, 1988, and will have a Diamond Jubilee theme to celebrate the museum's seventy-fifth anniversary year. The Dinosaur Ball is expected to raise over $300,000 to support the museum's exhibit and education programs.

For information about the Dinosaur Ball, please call 213/744-3438.



Steele Foundation Challenge Met—One Year Ahead of Schedule. The Natural History Museum has matched the Harry and Grace Steele Foundation $500,000 challenge grant for the museum's new Great Bird Hall one year ahead of schedule.

The Steele Foundation, which encourages matches in cash gifts rather than pledges, challenged the museum to raise the half million dollars within two years. The funds will be used for fabricating and installing the Hall's Wetlands Marsh Habitat. Generous museum contributors and friends of the Bird Hall project donated $500,000 in the first year of the two-year challenge; major funding to meet the grant came from the Petersen Publishing Company, the Unocal Corporation, Union Bank Foundation, Southern California Edison Company, the Los Angeles Audubon Society, and the Santa Anita Foundation, in addition to gifts from the museum's Governors, Natural History Museum Foundation trustees, Alliance Board members, and friends.

The Great Bird Hall, now in the final stages of design, represents a major advance in ornithological education and is one of three new permanent exhibits to be funded by the museum's $30 million Capital Campaign, according to Natural History Museum Director Dr. Craig C. Black. "The new Great Bird Hall, with its interactive displays and walk-through habitats, will serve as the prototype for other museums to follow in building natural history displays and will establish the Natural History Museum of Los Angeles County as a leader in display techniques," says Dr. Black.

The Wetlands Marsh Habitat, featuring major innovations in museum habitat design, will be one of three major walk-through environments within the Great Bird Hall, according to Dr. Ralph Schreiber, the Museum's Curator of Ornithology. Visitors to this realistic reconstruction of a breeding ground for ducks and geese will actually "experience" a visit to an Alberta Marsh. "The exhibit will provide visitors with a new understanding of the importance of birds in the world as well as an appreciation of nature and the urgent need to maintain the limited open space available for these creatures," says Schreiber.

The Great Bird Hall will also include California Condor and Tropical Rain Forest habitats and approximately twenty interactive displays. The hall will feature nearly 900 birds—many of them animated. Video programming and an interactive computer system will allow

visitors to gain access to an encyclopedia of information about birds; a wind tunnel will teach the aerodynamics of bird flight; and a bird mask will give visitors a "bird's eye view" of the world. Professor Percy Pelican, an animated character using the voice of actor Jonathan Winters, will define what a bird is and invite young visitors into the exhibit.

The new hall is scheduled to open in fall 1988 to coincide with the museum's seventy-fifth anniversary celebration. For more information on the Great Bird Hall and on participation in its building campaign, please contact the Natural History Museum Foundation Office at 213/744-3307.

Museum Publications Win Design Awards. Three of the Natural History Museum's recent publications have received Awards of Merit in the annual North American museum publication competition of the American Association of Museums. The award-winning publications are the *Natural History Museum of Los Angeles County Report, 1983–1985* and the February/March issue of the *Calendar,* produced by Robin Simpson and Kathy Talley-Jones of the museum's Publications Office and designed by Armin Krumbach of Tri-Arts Inc.; and the Dinosaurs Past and Present poster, designed and produced by Shelley Stephens and Elaine Fuess of the museum's Shops Management Office.

Every year, hundreds of museums from the United States and Canada submit entries to the competition, which honors excellence in the design of museum publications. Jurors look for simple, readable designs and effective use of text, type, paper, graphics, and color. The Natural History Museum is very proud to have received this recognition from the American Association of Museums.

Publicity Award to Public Relations Department. First place in the Publicity Club of Los Angeles's PRo Awards Continuing Program category went to the Natural History Museum of Los Angeles County Public Relations Department. Mary Ann Dunn received the award for the "Making the World Safe for Monarchs" publicity campaign. The award was presented at a banquet held recently at the Sheraton Universal Hotel.

To coincide with the annual Monarch migration, Julian Donahue of the museum's Entomology Section with Research Associate Christopher Nagano organized an international conference on the Monarch butterfly and a three-month-long Monarch butterfly exhibit. These activities were planned to excite the public imagination about the Monarchs and their unique migratory behavior, to bring together the latest scientific research about these insects, and to make the public aware that the wintering colonies of the Monarch are being destroyed. Trips to the wintering sites were offered as well.

Working closely with the scientists, Dunn arranged publicity for the conference and the exhibit and arranged for television and radio news coverage. Following the close of the exhibit, continued publicity about the Monarch tagging program and the threat to the winter sites kept the insects and the museum in the public eye.

As a result of the publicity, the exhibit received excellent attendance, the trips to tag Monarchs completely sold out, the recovery rate of tagged Monarchs increased 400 percent, and legislation has been proposed to protect the California wintering colonies.

Gifts That Will Always Be Remembered. To celebrate a birthday, an anniversary, a graduation, or other special occasion for a friend or relative, give a gift that will bring an entire year of continuing education and enjoyment.

A Natural History Museum gift membership will open up a new world of discovery. A beautiful card will be sent to inform the recipient of the gift. Please call the Membership Office at 213/744-3426 to find out how to give the special gift of a museum membership.

For someone who is already a member, consider a gift in his or her name to the Museum's Capital Campaign or Annual Fund to commemorate a special occasion. A memorial fund, a lasting tribute that honors the memory of friends or family members, can also be established. For more information, please call the Development Office at 213/744-3307.

Mary L. Romig Receives Special Volunteer Award. In recognition of her oustanding volunteer service, Mary Romig was selected Los Angeles County departmental Volunteer of the Year for the Museum of Natural History.

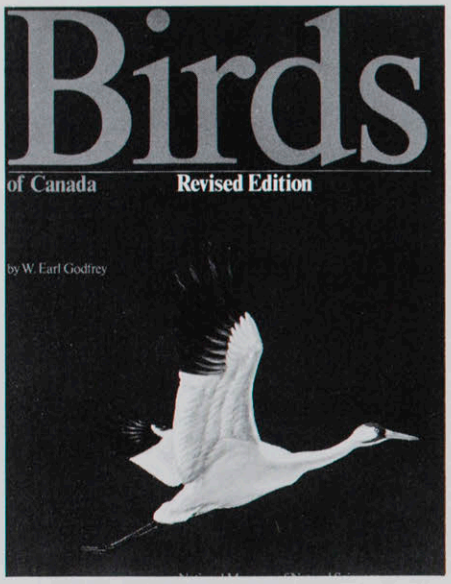
For 17 years Romig has been a volunteer scientist at the Rancho La Brea Tar Pits. When full-time excavation was resumed in 1969, she was soon among those excavating fossil bones. Recently, Romig has assisted in the identification,



The Pagé Museum's Mary Romig, Los Angeles County's Volunteer of the Year.

cataloging, and inventory of the paleopathology collection and assisted in the transfer of the Hancock Collection from the basement of the Natural History Museum to the George C. Page Museum. She has cataloged more than 21,000 specimens, served as librarian of the Chester Stock Memorial Library, and as Rancho La Brea archivist. She has also supervised other volunteers in the excavation of fossils at Pit 91 in Hancock Park and with the preparation of specimens in the Paleontology Laboratory of the Page Museum. In 1984, Romig authored the article "The Resurrection of Pit 91," published in the September/October issue of TERRA. She routinely works 40 hours a week and in 1974 was recognized as the Rancho La Brea Volunteer of the year.

This year, Romig received a special Los Angeles County award in the area of Arts and Humanities, the first of its kind presented to a museum volunteer. To quote from the County Board of Supervisor's handsome parchment award: "Whereas, Mary Lorraine Romig is an outstanding citizen and was selected as the volunteer of the year for the Museum of Natural History;...Now, therefore, be it resolved by the Board of Supervisors of the County of Los Angeles that Mary Lorraine Romig is hereby congratulated on being named the volunteer award recipient for Arts and Humanities, and she is highly commended for her scholarly contributions toward the preservation and interpretation of the paleontological heritage of the Rancho La Brea asphalt deposits."



THE BIRDS OF CANADA (rev. ed.) by W. Earl Godfrey, color illustrations by John A. Crosby, National Museums of Canada, Ottawa, 1986. Cloth, 595 pp., $39.95.

The bird life of the vast country of Canada is of more than idle interest to the nature enthusiast in southern California. Into or through its seasonally teeming tundra and taiga habitats, up and down its western coastlines and mountains, pass some of our region's most numerous and conspicuous wintering birds and migrants. Canada is indeed a grand hatching ground for migratory New World birds, but in addition it supports a fascinating far northern (boreal) resident birdlife unfamiliar in most of the Lower 48.

In 1966 the National Museums of Canada produced the first edition of *The Birds of Canada*, a work that was instantly and widely acclaimed for its extensive and informative analysis of the distribution, geographical variation, and identification of the birds of a land that remains today little explored in many of its more remote regions. Among birdwatchers, even in states far removed from the Canadian border, *The Birds of Canada* gained particular attention for John Crosby's accurate illustrations (498 species are depicted in color in the revised edition) and Godfrey's detailed discussions of field marks. Here was a regional guide doubling as a field guide of wide applicability. In my field birding infancy when *The Birds of Canada* first appeared, I turned to that work (over countless domestic alternatives) for enlightenment on numerous identification quandaries.

In the ensuing twenty years new and improved North American field guides have reduced the extent to which birders like myself have relied on the identification information in *The Birds of Canada*. Additions and improvements to the text and plates have increased the value of the revised edition of *The Birds of Canada* for identification—but it's just that the competition these days is stiffer.

The Birds of Canada has been updated to conform to current taxonomy (one of the author's chief consultants, Henri Ouellet of the National Museums of Canada, is a member of the American Ornithologists' Union Committee on Classification and Nomenclature). Distributional information has been modified as necessary, and text accounts have been added for several species new to Canada since the publication of the first edition; illustrations, generally in color, have been added for these newly recorded species. Many color plates have received additional figures depicting plumages not illustrated in the first edition.

Any nature enthusiast who visits, or plans to visit, Canada will want to own a copy of *The Birds of Canada;* there is no comparable single-volume reference to the birds of that giant and attractive country. Furthermore, all serious North American birdwatchers will find a trove of information about a significant part of the entire continent's avifauna in this work and need not use an up-coming trip to Canada as the only excuse for buying a copy.

Kimball L. Garrett
Collections Manager
Section of Birds and Mammals

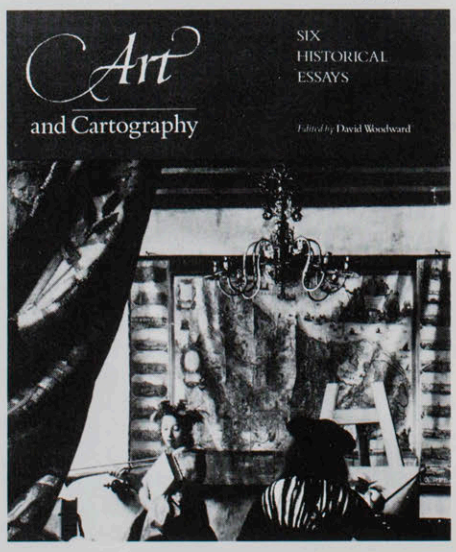
ART AND CARTOGRAPHY: SIX HISTORICAL ESSAYS edited by David Woodward, University of Chicago Press, 1987. Cloth, 249 pp., $65.

Map lovers have always felt that maps are works of art. On this point they will have no argument with the authors of *Art and Cartography: Six Historical Essays*. This handsomely illustrated collection of essays explores the many connections between the world of art and the world of cartography. Ably edited by David Woodward, professor of geography at the University of Wisconsin, the book is a series of lectures originally presented in 1980 at the Kenneth Nebenzahl, Jr., Lectures in the History of Cartography at the Newberry Library in Chicago.

The book is beautifully illustrated with thirty-four color plates of maps produced from the Middle Ages to the twentieth century. In addition, each article is accompanied by numerous black and white photographs. Despite its stiff price of $65, true map aficionados will want a copy for their libraries.

Traditionally, maps—especially old maps—have been treasured for their decorative appeal. The "intricate strapwork on cartouches, robust putti, sailing ships, sea monsters, and other embellishing paraphernalia" (p. 2) have always attracted the eye of the collector. The authors of the six essays in this book, however, see maps as more than pretty pictures. They study them in much the same way as they study old paintings—not only as objects with aesthetic appeal but as documents that have a great deal to say about the cultures that produced them. Samuel Y. Edgerton, Jr., discusses the "mental matrix" that disposed Europeans to organize the world into a grid pattern, not only in maps, but in art as well. Svetlana Alpers explores the "mapping impulse" in Dutch art of the sixteenth and seventeenth centuries. Juergen Schulz examines the metaphorical meaning of Italian Renaissance mural map cycles as found in the Palazzo Vecchio in Florence, the Vatican Palace, and the Palazzo Farnese at Caprarola. Ulla Ehrensvärd discusses the cultural meanings of color in cartography from the Middle Ages to modern times. James Welu's article traces the sources of cartographic ornamentation in sixteenth-

Continued on page 29



MAGNIFICATIONS
Scanning Electron Microscope Photography

by DAVID SCHARF

The first microscope, I imagine, was probably a drop of water through which someone saw his or her first glimpse into the microworld hundreds, possibly thousands, of years ago.

Microscopes have progressed from the water drop to the simple lens, to the compound microscope, to the computer-designed compound microscope, which brought us to what we thought were the approximate theoretical limits of magnification for light microscopy (around 2,000 times life size). High technology, however, has brought about the creation of new microscopes capable of going far beyond the resolution and magnification limits of light. These are electron microscopes, which illuminate objects with streams or showers of electrons rather than light; their lenses are magnetic instead of glass.

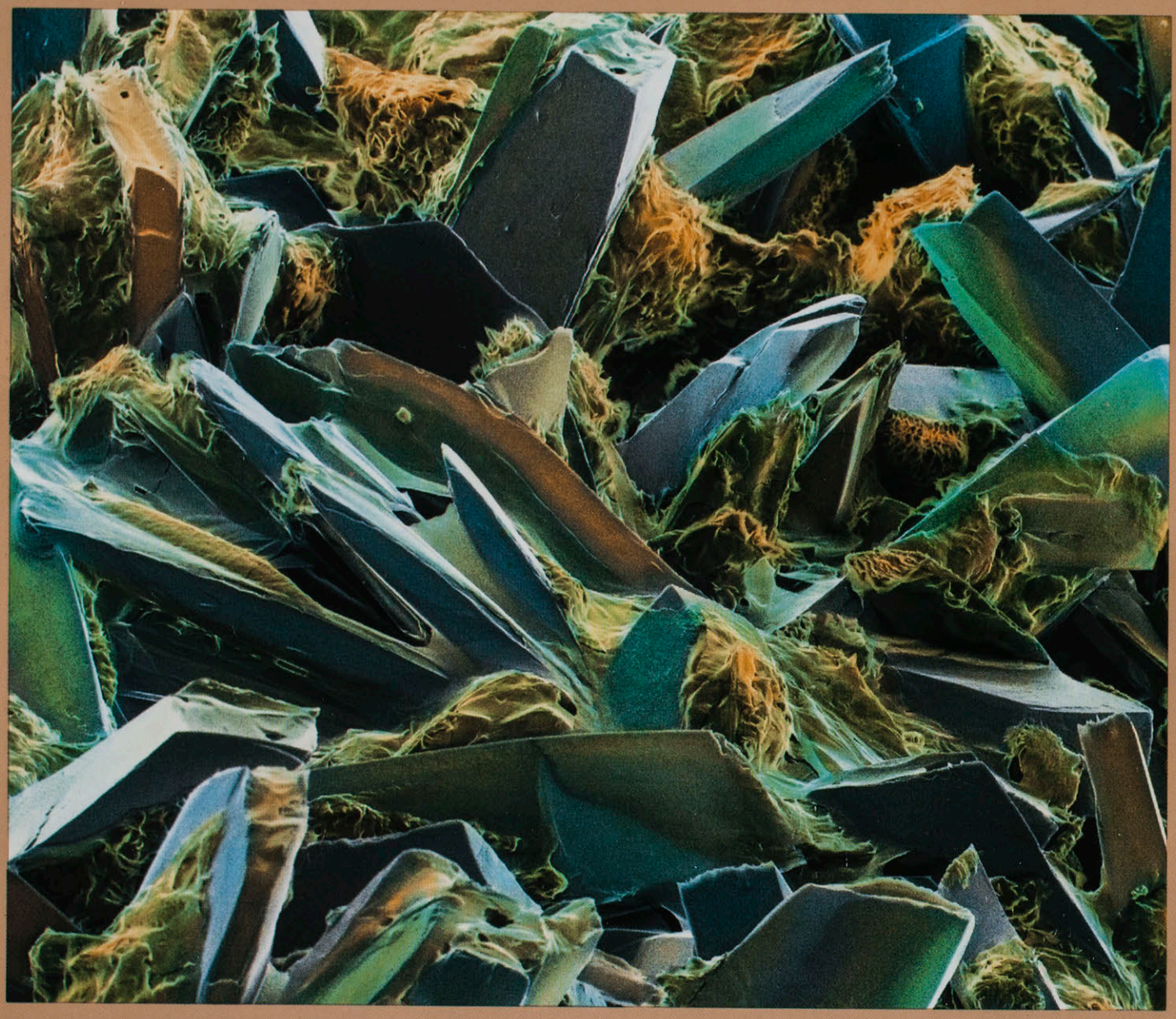
The first and oldest kind of electron microscope is the transmission electron microscope (TEM). This instrument uses extremely thin sections of specimens, through which it projects a shower of electrons onto a fluorescent screen—a kind of shadowgraph. The most recent kind of electron microscope, which was used to photograph the accompanying images, is the scanning electron microscope (SEM). This instrument uses a very finely focused beam of electrons, which it scans horizontally across the specimen, while the horizontal scan is moved vertically downward until it defines a full frame—just as a television scans its picture. In fact, the SEM's image is viewed on a television monitor. As the electron beam hits the specimen at any point, it knocks many other "secondary" electrons off of, or more accurately, "out of" the near surface, at which time they are attracted by an opposite charge to a phosphor sensor or *scintillator.* Upon hitting this sensor, the electrons, which vary in quantity with the topography of the sample being scanned, are converted to light pulses, transported out of the high vacuum chamber (in which all of the preceding has taken place) via a quartz *light pipe* to a photo-multiplier tube, a device that greatly amplifies faint light signals and converts them (back) into an electronic signal. Now that the signal is electronic (in the usual sense), and in a circuit, it may be processed, stored, converted, enhanced, or photographically recorded. We are able to record very high-resolution pictures with the SEM—on the order of 2,000 to 3,000 lines per frame.

One factor of major importance about the scanning electron microscope is its ability to view specimens that are intact and display their three dimensions instead of just two, as with the TEM. The specimens may be manipulated in three axes, as well as being tilted and rotated. Therefore, it is possible to view almost any part of an object, the size of which is limited only by the size of the vacuum chamber and our ability to manipulate it. Because of this, the SEM displays objects with startling realism, detail, and depth of focus.

Certain techniques are necessary to prepare a specimen for viewing in the SEM. The standard, and much of the time, necessary technique of preparing specimens for viewing under the electron beam in the SEM's high vacuum involves chemical fixation of the specimen, drying the specimen—that is, dehydration without appreciable shrinkage or distortion, and applying an extremely fine conductive layer of gold or other metal onto the specimen's surface to provide conductivity for the electron beam. The point of all this is to stabilize the specimen for high vacuum and high voltage with the minimum creation of artifacts. In many instances, however, I have been able to view living, unfixed specimens, as in the case of the insects in these photographs, having perfected techniques that use the natural conductivity of their living tissues. The difference between a SEM photograph of a dead animal or plant and a live one is quite dramatic. I once viewed and photographed a Jumping Spider for over 45 minutes in the SEM's high vacuum using a 5,000 volt electron beam. To my amazement he (or more probably she) was still very much alive when removed from the chamber. I then returned the spider to the garden.

One final important point is that electron microscopes do not display the specimen's color because they do not illuminate with light, but electrons, which have no color. I therefore have introduced my own color using photographic toners.

Magnifications: Scanning Electron Microscope Photography by David Scharf is on display in the Director's Gallery, which is on the second floor of the Natural History Museum, from September 5 through January 11, 1988. David Scharf is an internationally known artist of the scanning electron microscope (SEM). **Magnifications** includes over 75 black and white and color photographs of the microstructure of plants and insects, many of which have appeared in publications such as *Time, Natural History, Discover, National Geographic,* and now, of course, TERRA. Scharf's book *Magnifications,* which contains some of the SEM photographs seen here and in the exhibition, will be on sale in the Natural History Museum's Book Shop.



Glucose crystals magnified 450 times.



Human duodenum magnified 60 times.

Copyright © David Scharf, 1986
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Cat flea magnified 155 times.



THE GEM RESOURCES OF CHINA

The People's Republic's New Focus Is on Gemstone Exploitation

by PETER C. KELLER and WANG FUQUAN

China has historically been a land of great mystery, with natural resources and cultural treasures that, until recently, were almost entirely hidden from the outside world. Geologists and gemologists could only look at known geological maps of this huge country and speculate on the potential impact China would have on the world's gem markets if its gem resources were ever developed to their full potential.

During the past few years the government of the People's Republic of China (PRC) has opened its doors to the outside world in a quest for information and a desire for scientific and cultural cooperation. It was in this spirit of cooperation that a week-long series of lectures on gemstones and their origins was presented by the senior author and a colleague to over 100 geologists from all over China at the Geological Museum in Beijing. An important outcome of informal discussions with these geologists was a distribution map of the known gem occurrences in China (see pages 10–11). This was the first time in its history that the Chinese Academy of Geological Sciences had held such a lecture series entirely devoted to gemstones, since only during the last decade has the PRC placed any emphasis on gem materials. Jewelry and the possession of gems have not been part of the culture of the People's Republic. This has been changing over the last few years. What follows is a brief overview of China's important gem resources as we now know them.

AMBER. Large quantities of spectacular fossil insect- and plant-bearing amber have been recovered from the Fushun Coalfield, in the eastern part of Liaoning Province*, in northeastern China. Forty-four species of fossil insects have been described from the Fushun amber; of these species, forty-one were previously unknown.

The Fushun amber is found as transparent to translucent irregular masses up to four inches thick ranging in color from light yellowish brown to yellow; occasionally it is pink or deep red. The amber is commonly used for jewelry; larger pieces may be carved. The Chinese also grind up amber for its perceived medicinal value in relieving stomach ailments.

Amber was recently discovered in coalbeds near the city of Fuzhou in Fujian Province, southeastern China, but no information on the quality and quantity of the Fujian amber is currently available.

*For the sake of consistency, place names given throughout this article and in the map are spelled in accordance with the 1980 People's Republic of China map prepared by *National Geographic*.

CINNABAR. Since the late nineteenth century, mineral collectors have considered China synonymous with cinnabar (mercury sulfide). The world's finest cinnabar crystals, some as large as two and one-half inches, have come from the Wanshanchang mines on the border of Hunan and Guizhou provinces. These mines have been active since the Ming Dynasty (fourteenth century) and have employed up to 5,000 workers at a time.

Cinnabar is the principal ore of mercury. In addition to its industrial value as a source of mercury, the Chinese use it for medicinal purposes and as a pigment for paint, ink, and dyes. Cinnabar is also used as a coloring agent in lacquer applied to wood carvings. Massive cinnabar crystals are often found in limestone, and the Chinese find this combination very desirable as a carving material.

Some of the larger cinnabar crystals have been faceted for the collector, but because cinnabar has a hardness of only 2 to 2.5 on the Mohs scale (a scale of hardness for minerals; talc is 1 on the Mohs scale, and diamond 15) and is quite brittle, it is extremely difficult to facet. Furthermore, cinnabar is light sensitive and will darken dramatically after prolonged exposure to sunlight.



CORUNDUM. Corundum, principally in the form of gem sapphire, occurs in several areas of China. (Rubies and sapphires are forms of corundum.) The most important sources are the Penglai and Wenchang areas of Hainan Island, in the South China Sea, and the Mingxi area in west-central Fujian Province. Sapphire has also been reported from southeast Jiangsu Province, but little information is available on this deposit.

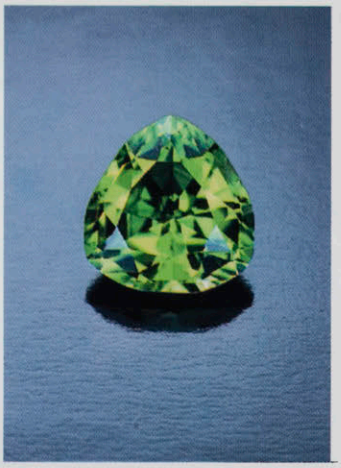
The sapphire deposits on Hainan Island and at Mingxi are still relatively undeveloped, although they show great potential. In both instances the deposits are thought to be the alluvial residue of alkali basalt deposits—that is, deposits that remain when volcanic rocks are washed by rivers—not unlike those found in Thailand and Cambodia.

Colorless to pale yellow zircon and dark red pyrope (a species of garnet) are commonly found in small quantities with corundum. The sapphires themselves look very much like those found in the alluvial deposits at Anakie, Queensland, and the New Engand area of New South Wales. They tend to be less than two-fifths of an inch in length, inky bluish green to greenish blue in color, and their transparency is generally good. Active geological exploration of the deposits on both Hainan Island and Mingxi are underway, as is experimentation with heat treatment to improve the color of the sapphire. China definitely has the potential to become a major supplier of sapphires to the world's gem markets.

Perfect hexagonal prisms of translucent ruby are being recovered from little-known deposits in Sichuan Province. Ruby has also been reported in gneiss in far western Xinjiang Uygur Autonomous Region, and in the Ailao Mountains of Yunnan Province.



These faceted pyrope garnets from near Donghai in northern Jiangsu Province, China, average .02 carats each. The relatively small size of the Chinese garnets limits their use in jewelry. Stones faceted by William C. Kerr; photograph © 1986 Tino Hammid.



This 2.87-carat peridot is from the Zhangjiakou-Xuanhua area of Hebei Province, China. Most of the world's peridot comes from Arizona; the Chinese deposit was discovered in 1979 and little is known about it. Stone faceted by William C. Kerr; photograph © 1986 Tino Hammid.



This nine-inch high, six-pound vase intricately carved with nine lions, is a particularly fine example of Chinese turquoise. China is now mining turquoise that rivals the finest found anywhere. Courtesy of the Geological Museum, Beijing.

DIAMOND. Perhaps no gem species evokes more excitement than diamond when one discusses the future gem potential of China. And for good reason: China has the potential, from both kimberlites (formations of igneous rocks that bear diamonds) and their associated alluvial deposits, to play a significant role in world diamond production. The importance of this diamond potential, as is the case with most of China's other gem resources, is only now being realized. Alluvial diamonds have been found in China since at least the 1940s. The major alluvial diamond-producing areas include the Linshu and Tancheng counties south of Mengyin in Shandong Province, and the Yuan River, near Yuanling, in Hunan Province. In addition, alluvial diamonds have been found in southeastern Xinjiang Uygur Autonomous Region.

While alluvial diamonds have been known in China for forty years, it was not until 1965 that diamonds were found in their kimberlite host. Today there are two principal diamond-bearing kimberlite districts in China: the Fuxian district, in southern Liaoning Province, and the Changma district near Mengyin, in central Shandong Province.

It is too early to say much about China's gem diamond potential in terms of annual production. A reasonable, educated guess of that figure would be about 45,000 to 75,000 carats per year. The largest known gem-quality diamond found in China thus far is a 158.79-carat brownish yellow stone known as the Changlin Diamond. This impressive diamond was found by a farmer in December 1977 on the Jishan People's Commune at Changlin in Linshu County, Shandong Province. It is interesting to note that no further exploration of the immediate area where this crystal was found has been attempted. In August 1981, the second largest diamond from China, the 124.27-carat Chengfu No. 1 Diamond, was found in Tancheng County, Shandong Province. Both diamonds were found in alluvial gravels that quite possibly derived from the Changma kimberlites located about 60 miles to the north. The third largest gem-quality diamond known from China, and the largest from a kimberlite, is the 199.01-carat diamond discovered in the Victory No. 1 pipes near Mengyin, in Shandong Province. This diamond was named Mengshan No. 1.

Although the diamond industry in China is still in its infancy, the Chinese government is committed to its rapid development. Literally thousands of geologists are currently prospecting for new deposits throughout China, including geologists from De Beers.

GARNET. Large numbers of pyrope garnets occur in Quaternary (the most recent geologic period) alluvial deposits near Donghai, in northern Jiangsu Province, eastern China. These garnets were probably derived from the diamond-bearing kimberlites that occur in the Mengyin area of Shandong Province, about eighty miles northwest of Donghai. Numerous alluvial diamond deposits have been identified between Donghai and Mengyin.

The pyrope garnets found near Donghai are generally very dark red and less than two-fifths of an inch in diameter. They are commonly transparent, and, because of their chromium content, many exhibit a distinct purple to red color change when exposed to daylight. The relatively small size of the Donghai pyropes limits their use in jewelry, although the Chinese Gem and Mineral Development Company is considering cutting the material as melee (small cut stones). Pyrope garnets have also been found to occur with sapphire and zircon near Mingxi in Fujian Province, but thus far no attempt has been made to determine the economic potential of this material.



This 9.5-carat sapphire crystal was found at the Lindi mine, near the town of Mingxi, in Fujian Province. China has the potential to become a major supplier of sapphires to the world's gem markets. Photograph Gemological Institute of America.



Several miners leave the small area of Ginxi Stream that they have been working for sapphire. Photograph by Peter C. Keller.

NEPHRITE. The term *jade* in China is often used to describe many different materials suitable for carving. For the purpose of this article, we will limit our discussion to nephrite jade, which differs mineralogically from jadeite jade. There are no known deposits of jadeite in China today, although the Burmese deposits have been of great commercial interest to the Chinese since the late eighteenth century.

By far the most important nephrite deposits in China are found on the northern slopes of the Kunlun Mountains in southern Xinjiang Uygur Autonomous Region. The principal mining centers are near towns of Hotan, Yutian, and Minfeng. Historically, the nephrite was found as alluvial boulders near the base of the mountain. Recently, however, nephrite was found in the Kunlun Mountains at an elevation of 9,850 feet.

The nephrite from the Kunlun Mountains does not differ significantly from that found in other regions of the world, such as Canada, the Soviet Union, and New Zealand. The nephrite in the Kunlun Mountains occurs in a great variety of colors, spanning the entire spectrum. While green is the most common color, the most desirable to the Chinese is the white or "mutton fat" nephrite. Nephrite from this area may also be called Hetian or Khotan jade, presumably referring to the specific mines in the area.

Nephrite has also been reported from a number of other localities. A green nephrite known as "Sister to Kunlun Jade" has been reported from near Manas, north of the Lian Mountains, in northwestern Xinjian Uygur Autonomous Region. Nephrite also occurs in Sichuan Province and in Taiwan. There are reports of nephrite in Liaoning Province; however, this locality is for the most part unconfirmed and may very well represent a deposit of nephritelike material. One example is cited in the April 3, 1984, issue of the *China Daily*. The front page photo shows a human chain around the "King of Jade," a 260.75-ton boulder extracted from the Xiuyan Jade Mine in Liaoning Province. It is questionable whether the "King of Jade" is indeed nephrite or one of its many simulants.

PEGMATITE GEMS. Granitic pegmatites, which crystallize from solutions of nearly solidified granite masses and within which are found many rare gems, are known throughout China. However, only those that occur in the northwest-southeast trending Altay Mountains of northern Xinjiang Uygur Autonomous Region are known to produce significant quantities of gem materials. Thousands of pegmatite dikes have been reported in the Altay Mountains. Of these, however, only those found just east of the city of Altay have been developed for their gem minerals.

A total of 74 minerals have been reported from the Altay pegmatite dikes. Many of these are rare minerals such as ixiolite, but almost all of the gem minerals that one associates with pegmatites—that is, tourmaline, spodumene, beryl, spessartine garnet, smoky quartz, and moonstone—have been found. Fine gem topaz appears to be absent from the Altay area, although very fine pale blue-green and rich yellow to red topaz crystals up to nine and one-half inches in length have been found in the Xilingeleimeng of Inner Mongolia Autonomous Region (Nei Mongolia), as well as in southern Yunnan Province. Very fine aquamarine, morganite, and goshenite crystals up to two inches in diameter have been recovered from pegmatites in Sichuan Province in central China.

To date, of all the Altay pegmatite gems, the various color of beryl have shown the greatest commercial promise.



Mrs. Wan Guo-dong, a member of the geological team that discovered the Changma diamond district in 1965, stands on a ledge overlooking the Victory No. 1 mine. Note the terracing in the background created by the open-pit mining method. China may one day play a significant role in world diamond production. Photograph by Peter C. Keller.



After initial crushing in the diamond treatment plant, the kimberlite ore is taken by conveyor belt through another series of crushing and screening to break the ore further for treatment in rotary washing pans. The resulting heavy concentrate is passed over grease belts; diamonds, being resistant to water, stick to the grease while other material passes over the belt. Photograph by Peter C. Keller.

Greenish yellow gem-quality beryl crystals up to six inches long and two inches wide have been seen by the authors. Large quantities of pale blue, finely developed aquamarine crystals have also been recovered and have, in fact, been observed on the mineral specimen market in the United States. It is unfortunate that until only recently, many of the beryl crystals were recovered for their industrial rather than gem value. The Altay pegmatites have yielded industry-grade beryl in crystals over twenty inches in length.

The Altay pegmatites have also produced gem tourmaline in red, pink, yellow, and (in rare instances) blue hues; bicoloured red-green tourmalines; and crystals of kunzite and spodumene.

PERIDOT. Peridot is derived from sheets of the earth's mantle that have been thrust into the crust. Most of the world's peridot comes from the San Carlos Indian Reservation in Arizona. However, gemmy pieces of attractive green peridot are currently being produced from the base of the Tertiary-age (around 70 million years old) Hanluoba basalt lava flows in the Zhanjikou–Xuanhua area of Hebei Province, about ninety miles northwest of Beijing. This deposit was discovered in 1979 by the Ministry of Geology and Mineral Resources. Little more is known at this time about the occurrence of the Chinese peridot, although a recent gemological study of samples from this area indicates that the material resembles peridot from San Carlos and may have occurred in a similar fashion. The Chinese peridots appear to be somewhat harder than their San Carlos counterparts and thus produce a polish comparable to Burmese peridots. It can be safely assumed that significant amounts of the material will be seen on the world's gem market in the future. The Chinese Gem and Mineral Development Company in Beijing is actively acquiring the rough material and faceting it for commercial distribution.

TURQUOISE. It is generally accepted that the finest turquoise in the world comes from the Nishapur district of Iran, and hence "Persian turquoise" has become a trade term for the top grade of turquoise. China is now producing turquoise that rivals the finest of the traditional "Persian."

It is not certain when the Chinese first began mining turquoise; although it has been popular in China for jewelry and carvings for centuries, much of the material could have been obtained from trading partners to the west. Still, archaeological finds of turquoise carvings that date as early as 1300 B.C. indicate that China's deposits may have been exploited for many centuries without the knowledge of the outside world. Many of the carvings now sold in Hong Kong are undoubtedly made of Chinese material.

Today, significant deposits of very fine turquoise are mined at Yunxian and Zhushan in the Wudang Mountain area of northwestern Hubei Province, and near Shanyang in Shaanxi Province, about 90 miles northwest of the Wudang Mountain area.

The turquoise from Hubei and Shaanxi occurs as compact nodules on or very near the surface of the ground. Nodules up to three inches in length are relatively common, and masses several times that size have been observed. The Geological Museum in Beijing has a nine-inch-high, six-pound turquoise statue called the "Nine Lions" carved of material from Hubei Province. The Chinese turquoise ranges in color from various shades of blue to light green with increasing iron content. It is not unusual to find perfectly homogenous masses, although very fine "spider web" nodules of turquoise crystals finely intermixed with matrix have also been observed.

A number of other gem materials have been reported from China, including fluorite from Wenxhou in Zheijiang Province, zircon from Fujian Province, and amethyst and azurite from Guangdong Province. Given the size and varied geology of the country, it is likely that many other gem materials, as well as other deposits of materials already identified, will be found as the People's Republic's current program of exploration and research continues.

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SIX DECADES OF "COMING UP ROSES"

The Exposition Park Rose Garden

by TOM SITTON

In August 1987, the Exposition Park Rose Garden was designated a Los Angeles County Point of Historical Interest. It is fitting that this historic site was recognized just before the sixtieth anniversary in 1988 of its completion as a display rose garden, the same year in which its next-door neighbor, the Natural History Museum, turns 75. Both of these landmarks had common origins and a related development because of their proximity and their role as integral components of Exposition Park.

The Exposition Park Rose Garden evolved from the redevelopment of what was known as Agricultural Park early in this century. In 1909, California's Sixth District Agricultural Association (owner of the property) and the county and city of Los Angeles agreed to a plan to transform Agricultural Park (renamed Exposition Park in 1910) into a cultural center. The state would build an exposition building and armory if the county would construct and operate a history and art museum and the city would maintain the grounds.

The early plans for the arrangement of the new structures included a large sunken garden situated on the northern portion of the old Agricultural Park race track. On this site the garden formed a quadrangle flanked by the County Museum of History, Science, and Art (now the Natural History Museum) on the west, the Armory on the east, the Exposition Building on the south (the latter now houses the California State Museum of Science and Industry), and open on the north side. Artists' conceptions of this plan depicted the garden as a very large open space—a lawn with a monumental statue in the center and wide walkways running north-south and east-west, the entire park to be "adorned with tropical trees and rare flowers and shrubs."

The three major park structures were completed between 1910 and 1914, when work on the sunken garden was begun. The 800 foot by 300 foot garden interior was lowered, and the entire area was surrounded by a brick wall in an hourglass pattern, opened in the centers of all four sides by wrought iron gates. On November 6, 1913, the official opening of the museum and exposition buildings, plans were announced for a memorial fountain that would include "a shaft rising more than 100 feet in the air, flanked by groups symbolic of the history of the city" to be built in the center of the garden to commemorate the completion of the Owens River Aqueduct. An Aqueduct Memorial Fountain Committee pledged to raise half a million dollars for this fountain, but the ambitious project apparently died with the approach of World War I.

From 1913 to 1920 the "sunken garden" was merely a large field of bermuda grass with a few trees and oiled walkways that met in a central circle. The following year witnessed the beginning of the garden's use as an actual garden rather than just an open space. The California Association of Nurserymen scheduled the "California Flower Show and Horticultural Exposition" for the garden in mid-October 1921 and vastly improved the garden for this event. A lily pond containing a circular fountian was built in the center of the garden, and thousands of flowers and trees were planted, many of which remained after the show was over. A particularly interesting feature of this horticultural exhibition was a cottage built as part of a landscape exhibit in the southwest corner of the garden. Inspired by the Scottish song "Wee Hoose 'Mang the Heather," the exhibit included a couple who dressed the part and actually lived in the cottage for the duration of the show.

The sunken flower garden was transformed into its present appearance when it was made a display rose garden in the period from 1926 to 1928. Under the direction of rosarians George C. Robinson and Fred H. Howard, a consultant for the American Rose Society, the city's Parks Department embarked on a project to create the "largest and most magnificent public rose garden in the United States." Since the area encompassing the small municipal rose garden behind the county museum was needed for other purposes, it was decided to devote the entire seven-acre sunken garden to the display of roses.

The project began as city workers removed eight inches of topsoil from the area to be planted with roses and replaced the earth with leaf mold and soil from the canyons in Griffith Park. Colored lights were added to the large circular concrete fountain and lily pond in the center of the garden, and four wooden pergolas "with comfortable seats" were installed, one in each quadrant of the garden. By April 1928, the garden was complete—15,793 rose bushes donated by local nurseries were in full bloom, observed a *Los Angeles Times* reporter, who hailed the garden as the largest in America.

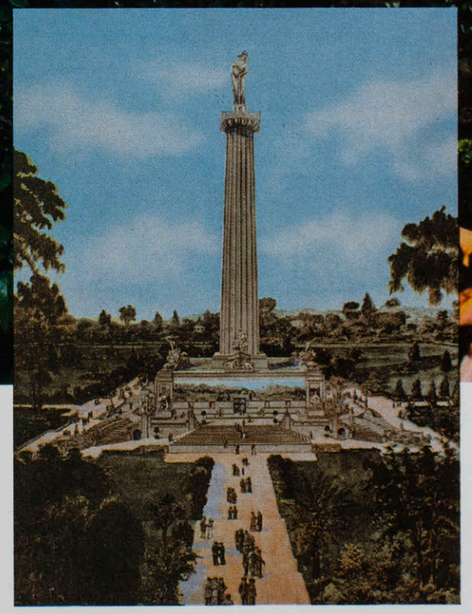
Along with the construction of the Memorial Coliseum, the Exposition Club House, and the Los Angeles Swimming Stadium, the creation of the new

Continued on page 18



"As stars are the poetry of heaven flowers are the poetry of the earth" (from an inscription on the rose garden's south entrance). Photograph by Jalien Tulley and Noella Ballenger.

"The garden is the outdoor continuation of the house" (from an inscription on the rose garden's south entrance). Photograph by Jalien Tulley and Noella Ballenger.



This artist's conception of the Owens River Aqueduct Memorial Fountain appeared on the official invitation to the Exposition Park celebration on November 5 and 6, 1913. The monument was never built; in its place today is a far more modest fountain and lily pond.



The 1921 California Flower Show was the first step in the transformation of the sunken garden into a showcase for various specimens of horticultural beauty.

Continued from page 15

rose garden was one of the major projects that improved the entire park in the decade before the commencement of the 1932 Olympic Games in Los Angeles. Just in time for these festivities, the city added long concrete benches and walls with Olympics-related figures in relief on the north side, and the elaborate light posts on the north and south sides as grand entrances for the many athletes and spectators who visited Exposition Park in 1932.

For a number of years the garden was decorated with several sculptural pieces. In 1936, four statues by Thyra Boldsen were loaned and dedicated in the garden, only to be reclaimed by one of her descendants in 1968. Two sculptures by Caroline A. Lloyd were donated to the city by her daughter in 1946. Placed in the pergolas in the western half of the garden, one of them ("Repose") still remains; the other became a victim of thieves.

Besides its basic function as an open space that orients visitors in Exposition Park and provides a quiet, aesthetic foreground for the major structures, the rose garden is also important for its intended use. As a public display rose garden it offers visitors the opportunity to study the growth of currently-available rose cultivars so that they can decide whether or not to grow these hybrids in their own gardens. With about two hundred cultivars in bloom each season, the garden is one of the largest and most significant public display rose gardens in California.



The Robert Liddell family added a touch of fantasy to the California Flower Show by living in the "Wee Hoose 'Mang the Heather" cottage for the duration of the 1921 California Flower Show. Courtesy of Mrs. Louis Whitman.

The sunken garden as it appeared at the beginning of the California Flower Show in 1921.



Although the original rose bushes of 1928 have long since been replaced, a number of plantings from the 1940s and 1950s still survive. As new hybrids become available, the older bushes, particularly those that developed poorly, are removed. Space must also be secured for the annual All-America rose selections, since the rose garden is one of the recipients of these new cultivars.

Today the Exposition Park Rose Garden is one of the three major public display rose gardens in southern California and one of the most important in the state, according to Clair G. Martin III, rosarian of the Henry E. Huntington Botanical Gardens in San Marino. A retreat from the surrounding hustle and bustle of urban activity, it is still the scene of a myriad of activities: educational pruning demonstrations, photographic sessions for wedding parties on the weekends, and casual strolls through the garden by museum visitors, rose lovers, and others who appreciate the beauty of this urban oasis. In spite of recent suggestions that it be recycled into a football practice field or multi-level parking lot, the Exposition Park Rose Garden remains an essential part of the entire complex that is Exposition Park.

Tom Sitton is Head of the museum's Section of Social History and is responsible for surveying historic sites in Los Angeles County.

This October 1919 photograph of the making of a motion picture depicts the original austerity of the sunken garden in its early years.



SHARKS OF THE SHALLOWS

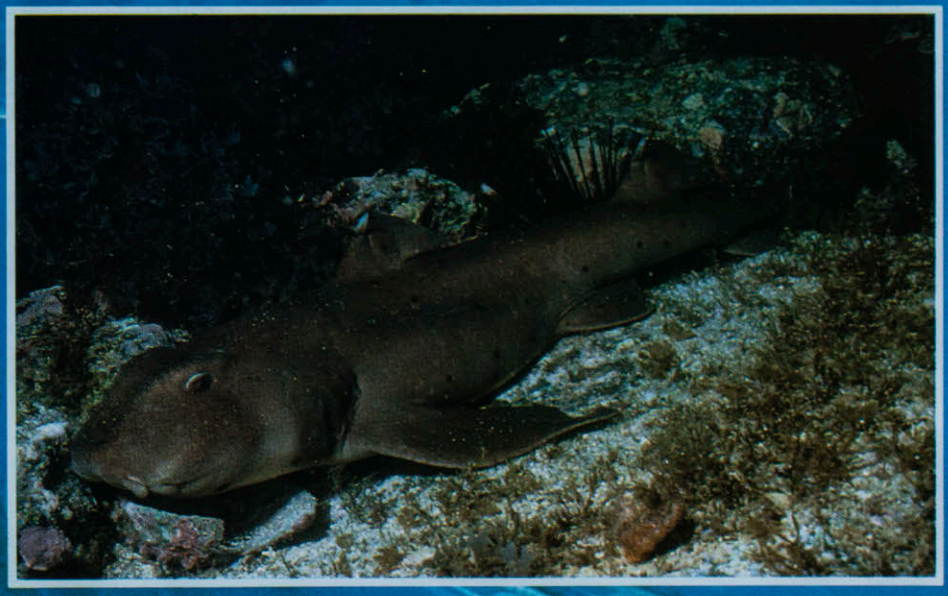
A Photographer Explores the Temperate Waters off Catalina

Articles and Photographs by
JEREMY STAFFORD-DEITSCH









P. 20 and 21, spread:

The seascape in the shallow waters of temperate seas is rich in seaweeds and none is more spectacular than the California giant kelp. This magnificent plant forms great forests within which countless animals live. Here, a school of jack mackerel (Trachurus symmetricus) *have massed within the sheltering arches of the kelp.*

P. 20, top:

This is a juvenile leopard shark just over two feet in length. Adults do not normally exceed five feet, and their color fades to a dull brown. Leopard sharks are well able to rest on the bottom where they are effectively camouflaged.

P. 20, bottom:

The swell shark's technique of filling its stomach with water or air to greatly increase its size is useful defensive behavior. For example, an alarmed shark can swallow water and so inflate itself in a rock crevice that it cannot be removed. A sluggish swimmer, the swell shark hunts at night picking up fish that are asleep on the bottom. The enormous mouth can also be used to trick an unfortunate fish: the shark holds its mouth open, and the fish swims in, by mistake. Alternatively, the shark will give a great gulp and suck in a fish that wanders too close.

P. 21, top:

An angel shark rests on the sandy seabed beneath the California kelp forests. This is a mature male—the claspers can be seen extending backward on either side of the pelvic fins. An abundant predator, this species is found in the Pacific waters of both North and South America.

P. 21, bottom:

The California horn shark uses its strong pectoral fins to clamber over the rocks in search of sea urchins. Its teeth are fused into a cobbled pavementlike structure, ideal for crushing and breaking up its food. Note the exposed fin spines on both fins. This is a mature specimen about three feet in length.

Moving northward from the warm waters of the tropics brings some groups of sharks into ascendancy, others into decline. Since sharks are basically cold blooded, their metabolic rates are largely under the control of the environment, though a few species can maintain a body temperature significantly above that of the surrounding water. As we move north and the temperature of the water falls, so certain species become established while others thin out and vanish. Not only does the temperature of the water directly affect the sharks' metabolic rates, but it has secondary effects that also influence their distribution. One is that the solubility of gases varies according to water temperature, and this affects animal life because the amount of oxygen dissolved in the sea water is crucial to their respiratory requirements. Oxygen is significantly less soluble in warmer water: in shallow, tropical lagoons I have seen oxygen (produced by all plants during photosynthesis) bubbling up from algae on the bottom. In cold water this would not happen—the oxygen would dissolve as it was produced.

There are other factors that affect the distribution of sharks. The clarity of the water, the depth of penetration of light, oceanic currents, and the availability of prey animals—all these interact to determine where a particular species is found.

Some species of shark that have a limited tolerance for temperature change will migrate seasonally north or south to remain within their preferred range, while others, although more tolerant of temperature fluctuations, will migrate in pursuit of prey. Consequently, there is no clear dividing line between the shark species found in tropical and temperate waters. Some species are plentiful in both, the shortfin mako *(Isurus oxyrinchus)* for example, which is widespread throughout the tropical, subtropical, and temperate waters of the world, being able to handle a wide range of temperatures. On the other hand, though the blue shark *(Prionace glauca)* prefers a cool environment, it is abundant not only in temperate waters, but also in the tropics. Here it performs what is known as "tropical submergence"—spending most of the time in deeper waters, to attain its preferred temperature.

The mean average surface temperature of the ocean off California (north of Baja) is between 50° and 68°F. This is termed a temperate or warm-temperate range (to distinguish it from the cool-temperate or boreal range of 41° to 50°F to the north). The water temperature here contrasts with that in the tropical region (which includes Florida and the Bahamas, although they are north of the Tropic of Cancer) where the mean surface temperature of the seawater is greater than 68°F. Off the California coast the water feels cold even when the sun is shining. Yet California's coastline has its own special attraction for divers, a unique habitat known as "kelp forest."

The backbone of the kelp forest is the giant bladder kelp *(Macrocystis pyrifera)*. Individual plants can climb to the surface from a depth of 100 feet to bask their broad fronds on the surface in green canopies. A healthy kelp forest can cover several square miles but kelp forests are comparatively rare, for they need a special set of environmental conditions. A rocky bottom on which the plants can anchor themselves is essential, plus a strong current to provide the plants with a rich supply of nutrients. Once established, the kelp forest is a valuable habitat for other species. Hundreds of different animals and plants, including other seaweeds, worms, mollusks, crabs, starfish, and a great variety of fish, have adapted themselves to shelter in this rich green world.

In August 1986 I was fortunate enough to be able to join Don Nelson and several of his research students on his boat off Catalina Island, which is 19 miles from the coast of southern California. Don is a biology professor at California State University, Long Beach. His specialty is sharks and his passion is their study, not in a laboratory, but in the wild.

One of Don's students, Rocky Strong, is studying the California horn shark *(Heterodontus francisci)*, a curious-looking shark that is common in the shallow waters around Catalina Island. During that trip Rocky agreed to take me down on a dive and show me some horn sharks so that I could photograph them, and then—if we had enough air and enough bottom-time left—to go deeper in search of an angel shark *(Squatina californica)*.

I had already photographed two other sharks common in these waters—a leopard shark *(Triakis semifasciata)* and a swell shark *(Cephaloscyllium ventriosum)*. Both are interesting for several reasons, but neither of them was my reason for coming to Catalina Island. For while the leopard shark is a fairly typical-looking shark, the angel shark and the horn shark represent more extreme modifications of the basic shark design. The prospect of photographing both on one dive was exciting indeed.

Kitted up in our diving equipment, we set off for the buoy where the dive would

begin. There was a current working against us, and it was taking Rocky and I longer than we had expected to swim to the buoy. Indeed, though it was a mere 33 yards ahead, we were making very slow progress. I was carrying two bulky underwater cameras that made me even slower than Rocky, and he was gradually pulling ahead of me. I envied him his dry suit—in my wet suit I could feel the coolness of the surface water and knew that it would be much colder below. It was many years since I had dived in anything but tropical waters and I was unaccustomed to the cold.

Thirty-three murky feet below me I could just make out the bottom—sand and scattered masses of seaweed. It reminded me of dives, many years ago, off the south coast of England. Beneath me, something dark caught my attention as it moved across the sand. The body was flattened and shaped like a kite, but with a long, strong, sharklike tail. I realized that it was a type of ray called a guitarfish, an animal that looks half-shark and half-ray. I would have loved to have dived down and photographed it, but in that current I could not have reached it. By the time I had got down to the bottom it would have gone. And so would Rocky. So I ignored the temptation.

Eventually we reached the buoy and grabbed hold of it for a short rest. Thirty minutes of swimming to cover 33 yards! Then we set our watches and descended, gripping the thick, barnacled chain of the buoy to offset the sideways drag of the current. Every yard that we descended, the current lessened, but it also grew colder. At 59 feet we reached the bottom—rock and sand, covered in dark green fronds of kelp.

To the right I could see that the bottom dropped sharply to much deeper water. Rocky began looking for the horn sharks, which spend the hours of daylight hidden under seaweed and in rock crevices. He lifted several broad fronds of kelp and looked beneath them. Within less than a minute he found a small horn shark, resting in the shade of a kelp frond. It was a juvenile, about 16 inches long and, unlike the adults, covered in brown spots. Rocky gestured at me to take a picture of it—but there was a problem. In lifting up the fronds of kelp, we had disturbed the sand and the water was too murky. I took a couple of shots—just in case this was the only horn shark I ever saw—and then gestured that I had finished. Rocky picked up the small shark and put it into a bag, to be tagged, measured, weighed, and released. We kept searching and found another, larger horn shark over 3 feet in length. But again the act of searching had stirred up the water around the shark too much for a good photograph. I attempted to communicate this to Rocky, and I signalled downward: we were obviously going to need another method to photograph the horn sharks, so I thought we might as well go straight after the angel sharks now. We headed off down the rock and seaweed slope, and suddenly the cold water got even colder as we passed through what is known as the thermocline—a meeting point between two blocks of water of markedly different temperatures and densities. Because of the temperature change, the animals living above the thermocline are often very different from those living below it.

The water was unpleasantly cold—I would guess 57°F at the most. We continued down to 105 feet where the slope suddenly gave way to a sandy bottom in a murky green world. Rocky swam off, staring at the bottom, paying particular attention to the areas where the sand met the kelp-covered slope above. He stopped and pointed beneath me. I peered down—nothing to see but sand and a few grey pebbles. He carried on pointing, so I looked a little closer. Then I realized that the pebbles were not pebbles at all, but splotches of color on something half-buried in the sand. I could make out a tail, and, more or less, a head. It was an angel shark of about five feet in length. But before I could photograph it, I knew I would have to remove the sand so that it was visible. Its camouflage was too good to make a comprehensible photograph. I carefully wafted my hand back and forth above the shark in an attempt to remove the sand layer that it was hiding under. It put up with this for only a short while before erupting from the sand with a lazy shrug and swimming off into the depths.

We were out of bottom-time and low on air, so Rocky and I returned to the surface, letting the current carry us back to Don Nelson's anchored research vessel, the *Discovery*. While Rocky was busy measuring, weighing, and tagging the two horn sharks he had caught, I discussed with Don the problems to be overcome in order to photograph these two types of shark. He suggested that, later in the day, I should dive off a small rocky island called Ship Rock, which we could see jutting out of the sea about a mile from our anchorage. Don explained that the water there is often relatively clear and also that the marine life around the rock is spectacular. The giant kelp forms green cloisters and arches through which schools of fish swarm. Horn sharks are well hidden in the crevices and difficult to find, but angel sharks are plentiful on the sand in the deeper water.

That afternoon, I prepared to dive on Ship Rock, with another of Don's students, Larry Smith. Larry is studying chemical shark repellency—what chemicals can repel sharks and therefore, perhaps, prevent shark attacks. When we arrived at Ship Rock, I could see the thick green fronds of kelp forming a layer on the surface. A couple of sea lions splashed through the kelp as we rolled into the water, and at once I could see that it was clearer than before. Larry headed down toward the bottom and I followed, passing numerous fish that I half-recognized as cousins of tropical species. At 33 feet, we reached the rocks below, billowing with countless varieties of seaweed, every one a different shape and a different shade of green or brown. The richness of these waters was stunning. Bright orange fish, called garibaldi, flitted all over the rocks, together with many other, less conspicuous species. We descended the rocky slope, moving through gaps in the great climbing columns of the kelp forest. I glanced back up to the surface and was reminded of the fairy tale of Jack-and-the-Beanstalk. At 82 feet Larry and I passed through the same cruel thermocline into a darker, duller world. At 110 feet we reached the end of the rocks and the beginnings of the sand.

There were angel sharks everywhere—on the sand, some buried, some exposed, all stationary. I swam 11 yards and counted twelve sharks lying around. When I moved a little deeper, however, the numbers quickly declined. Perhaps they mass at the edge of the kelp to ambush any fish that strays from the shelter of the weeds and rocks. I picked out one to photograph, and he remained motionless, seemingly oblivious to my presence.

Don later told me that a colleague of his had estimated the number of angel sharks around Catalina Island to be about 4,000—an astonishing number for such a small area. I asked him how this number was arrived at, and he explained the procedure: imagine that you have a jar filled with rice and you want to know roughly how many grains there are in the jar, but cannot count them all up. Instead, you remove a known number of grains (say 100) and then label them with a dab of paint. You put them back into the jar and shake it thoroughly so that they are mixed in with all the others. Now, you remove a sample of rice grains from the jar—again, a hundred. In that number you find ten of the grains you marked. You know that you marked a hundred and that the ratio of the marked-

to-unmarked is one-to-ten. Therefore, there must be approximately ten times as many grains in the jar as the number you marked, in other words, about a thousand. In the same way, you catch and tag a known number of angel sharks, or any other animal. You then return them to the sea and let them mix in with the rest of the population. At a later date, you observe the number of tagged versus untagged. From this ratio, you can get a rough idea of the total population. It is known as the mark-release-recapture method.

Now that the angel sharks had been photographed, only the horn sharks remained. Rocky explained that they are nocturnal, coming out of their daytime retreats at nightfall, to clamber across the rocks on their broad pectoral fins, searching for sea urchins. They can be found in water as shallow as 33 feet when feeding. Rocky's research is involved with the movement of horn sharks, and he has fitted radio-transmitters to several of them. By hunting around in a boat and dipping a hydrophone into the water, it is possible for him to locate, identify, and follow each "tagged" shark.

I had little difficulty in persuading him to take me down on his dive that night, and a few hours later we were moving across the darkened waters of the bay, tracking down the signals from a shark. Sure enough we were led to a shallow rock reef, and when we dived down on it, we were not surprised to find hundreds of sea urchins, the horn shark's favorite meal. Dispersed among them were horn sharks, some resting, some swimming. In fact, as I swam down the anchor chain, the first horn shark I saw was swimming frantically around the anchor. It looked as if the anchor had landed near him and scared him out of his wits. Eventually he calmed down, and I set to work. Now that they were out in the open, photographing the horn sharks was a great deal easier than it had been on my first abortive dive. The only problem that I had to contend with was how to photograph them without impaling myself on their food supply—the sea urchins.

Jeremy Stafford-Deitsch is a marine photographer and explorer who spent three years in the pursuit of sharks. Excerpted with permission of Sierra Club Books from Shark: A Photographer's Story, *copyright © 1987 by Jeremy Stafford-Deitsch.*

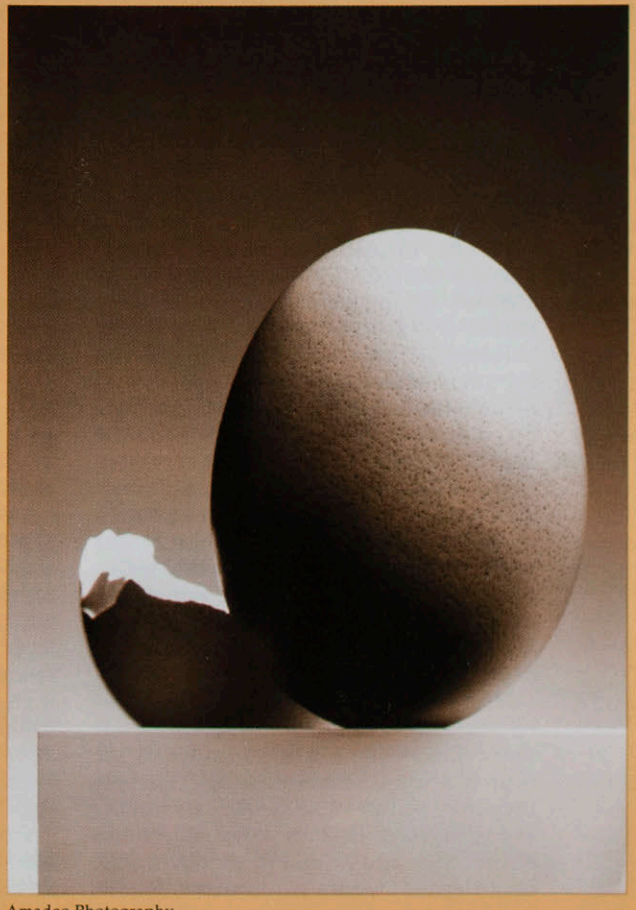
A blue shark swims beneath a research vessel.



A PAEAN TO THE PROTEAN EGG

An Anecdotal History (with Recipes) Celebrating the All-Enduring Egg

by WILLIAM BREEN

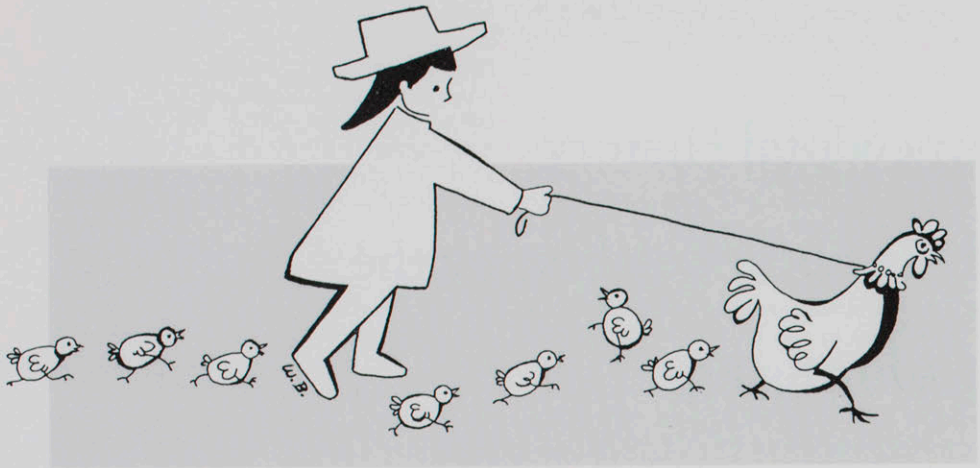


Amadeo Photography

When the nineteenth-century French gourmet Charles Monselet concluded that "the egg is the Proteus of the kitchen," he could with equal truth have said the same of the chicken. Throughout the world's history incredibly varied dishes have been devised for both and surely will continue to be.

Some do indeed leave the form and the appearance of the egg or chicken reasonably intact. Others, however, metamorphose them into singular departures from the originals. Nothing could look less like its fundamental sources, for example, than the intriguing Chinese creation known as "Chicken Velvet." This dish was the favorite food of Tz'u-hsi, the strong-willed woman who entered the imperial Chinese court as a concubine, but ruled China as empress dowager from 1862 to 1908.

I hope you will indulge me in this recipe involving chicken even though we are lauding the culinary virtuosity of the egg. It is an inescapable truth that where there is one there is always a link to the other. You will observe that in the case of "Chicken Velvet," it amounts to a relationship of the highest order—an intimate blend of minced chicken and egg whites.



CHICKEN VELVET

Step 1
1 chicken breast
3 egg whites
1 cup chicken broth
½ teaspoon dry sherry
½ teaspoon salt
1 Tablespoon corn starch
2 cups cooking oil

Bone and skin the chicken breast, removing fat and the two tendons. Dice the chicken meat.

Blend diced chicken meat in blender at a low speed, adding chicken broth a teaspoon at a time. When chicken becomes a thin, smooth paste, put it into a mixing bowl, discarding all gristle attached to the blades.

Fold in lightly beaten egg whites, remaining chicken broth, sherry, salt, and cornstarch with the chicken paste.

Heat oil in skillet over medium heat to about 300 degrees. Spread the thin chicken paste in the oil by the tablespoonfuls, but just enough to cover the bottom of the skillet. Immediately add another layer and finish with two or three more. When chicken paste turns white and firm, immediately remove skillet from heat and put the cooked chicken paste into a colander or strainer. Drain off and retain two tablespoons of the oil.

Step 2
2 Tablespoons cooked and minced Virginia ham
1 cup snow peas, stringed, rinsed, and dried
2 Tablespoons oil in which chicken paste was cooked
¼ teaspoon salt
½ Tablespoon cornstarch
¾ cup chicken broth

Mix cornstarch with chicken broth and set aside.

Heat oil in same skillet over medium high heat. Add salt and stir in snow peas for a few seconds. Add in the well-stirred cornstarch mixture, stirring constantly. As soon as the liquid thickens, very gently fold in the cooked chicken, remove to a serving plate, and garnish with minced ham. Serve immediately.

This is a delicate dish with a very attractive and colorful appearance. It will amply serve two people; if served in the Chinese manner, however, it will serve four to six since it will be one of a number of dishes surrounding a soup in the center.



The egg is so very beautiful to behold that it has inspired humankind throughout the centuries. It seems to suggest answers to the most profound cosmic riddles. Which *did* come first—the chicken or the egg? "A hen is only an egg's way of making another egg," so said Samuel Butler about a hundred years ago. This seems to settle the question, but he also authored a novel called *Erewhon*, wherein he maintained that a total inversion of most of what we take for granted in our economic and social structures would effectively cure the world's ills. I am not certian that we can trust Mr. Butler for our answer—consider that the egg could equally be the hen's way of making another hen.

Does the shell of the egg give us a clue? At least we know that what is inside came first. Suppose we remove those contents and discover how interestingly they may be put back in. We can wonder at the mystery of it all as we adjourn to the kitchen and attend to producing the very elegant "Oeufs aux Caviare."

OEUFS AUX CAVIARE

6 jumbo eggs (white shelled)
½ teaspoon minced fresh tarragon
1 cup whipping cream
3 Tablespoons butter
1 Tablespoon water
white pepper and salt
juice ½ lemon
2 Tablespoons vodka
1 one-oz. jar black caviar

Carefully cut off the tops of four eggs with a paring knife and drain the contents into a small bowl. With equal care put aside the four egg shells. Add the remaining two eggs to those in the bowl.

Whip the cream until soft peaks form; stir in the vodka and lemon juice. Fill a pastry tube with the cream and put aside.

Add the water, tarragon, salt, and pepper to the eggs. Whip the eggs until frothy and scramble them in the butter, which you have melted into a medium-size sauce pan, until creamy.

Carefully fill each of the four egg shells with the scrambled eggs, setting each on a lacy paper doily in your prettiest small glass. Crystal glasses shaped like tiny martini glasses would be perfect.

Pipe a collar of whipped cream around the top of each egg and continue piping on whipped cream until top is covered. Sprinkle with caviar and serve. The choices as to *when* to serve this dish are so various that I give you *carte blanche*. The recipe serves four.

I should certainly add that Chef Laurent Quenioux of the Seventh Street Bistro has graciously permitted use of this recipe.



Still the good egg sits there, its mystery and loveliness as disconcerting as ever. It has gone through a lot of protean activity just to get here, albeit protected all the way. An example of this is the white ropelike structure known as *chalaza*, which is contained in the innermost layer of the egg-white albumen. These strands are attached to the thick albumen and help anchor the yoke, but also enable it to turn easily and without damage. We notice the chalaza as that slithery "yuk" part before our scrambled eggs have quite finished cooking.

On the yolk is the pinhead-sized *germ spot* that under suitable conditions in a fertile egg develops into an embryo.



Since the purpose of the egg is to protect and nourish the young animal-to-be within, the contents of the egg supply a well-balanced diet to the developing embryo. Even the eggshell, being composed almost entirely of calcium carbonate, provides bone-forming and body-building calcium to the bedraggled chick as it pecks its way into the world.

Does the egg supply human beings with the basis for a well-balanced diet? Two eggs supply us with all the amino acids needed for growth, iron in easily assimilable form, and a fine balance of saturated and unsaturated fats. The quickest way to have our breakfast eggs is to combine the nutrition of the egg with that of orange juice in an uncooked and intelligent version of "Orange Fool." All you do is break two eggs in a glass of orange juice and whirl it in the blender. Add a little honey and sprinkle the drink with cinnamon or nutmeg.



Even such a perfect food as the all-enduring egg has been maltreated numberless times over the years. A striking example occurred in Dawson, a Yukon Territory town, in 1897. This was the year that "Swiftwater" Bill Gates struck it rich and went about with a gold-stuffed poke. His amorata, one Gussie Lamore, had an unfailing appetite for eggs, and Swiftwater kept her plentifully supplied even during the food shortage of that year.

Things took a turn for the worse when he discovered Gussie dining tête-à-tête with a well-known gambler over plates of fried eggs. Even though they were the most expensive item on the menu, Swiftwater bought up every egg he could find. He then had them fried up, and one by one pitched them out the window to a pack of famished dogs. He thus acquired a special title and came to be known as the "Knight of the Golden Omelette." A footnote tells us that he forgave Gussie and continued to be her extravagant suitor. She of course neglected to mention that she had one husband already.

Another woman who loved her eggs was actress Lillian Russell. She used to devour vast quantities of "Eggs Maintenon" and similar dishes at Delmonico's. That fabulous New York restaurant of late Victorian times was unquestionably her favorite haunt. There she vied with "Diamond Jim" Brady in the consumption of eggs as well as other foods. She is known to have topped him in the amount of plover and quail eggs that she could down with the greatest gusto imaginable.

EGGS MAINTENON

6 slices white bread
6 Tablespoons butter
1¼ cups *sauce Soubise*
6 poached eggs, drained
freshly grated Parmesan cheese

Sauté bread in butter on both sides until golden brown. Spoon some of the hot sauce over each slice. Put an egg on each slice and cover with remaining *sauce Soubise*. Sprinkle with the cheese and pop under the broiler for a minute. Serves six.

Another version has chopped truffles, chicken, and mushrooms added to the sauce.

Sauce Soubise
2 cups sliced yellow onions
3 Tablespoons butter
2 Tablespoons flour
1 cup boiling milk
salt and pepper to taste
dash nutmeg
2 to 4 Tablespoons heavy cream

Sauté onions in butter over low heat, covered, until soft but not brown (20 to 30 minutes). Stir in flour. Remove pan from heat and stir in milk. Return to heat and simmer ten minutes, stirring occasionally. Purée in blender, add seasonings, and thin to desired consistency with cream. Makes one and one-quarter cups.



Animal bones indicate the domestication of the *harappa*, the Indian jungle fowl of the Indus Valley, as early as 5500 B.C. Our present chicken is a descendant of this ancient bird. It seems probable that domestic eggs were being eaten in India around that time as well; however, no physical evidence or records have been found that date prior to 2000 B.C. to indicate that this is so.

Americans have always eaten plover, quail, and wild duck eggs. In the nineteenth century our continuingly reckless consumption of gull, tern, and murre eggs led to conservation measures that were finally adapted in many of the nesting sites. Obviously most of us descend from a long line of egg lovers. And one way to love eggs for dinner is in a soufflé.

SOUFFLE POUR L'ENTREE

4½ Tablespoons butter
4½ Tablespoons flour
1½ cups boiling milk
1 teaspoon salt
dash white pepper
dash nutmeg
6 egg yolks plus 8 egg whites
butter for soufflé dish

Melt butter over low heat and whisk in the flour. Add the milk and whisk until well blended. Remove to bowl. Add seasonings and egg yolks. Beat egg whites stiff and fold in gently. Butter a nine-cup soufflé dish. Pour in mixture. Cook for 35 minutes in a 375 degree oven or until puffed and golden brown. Serve immediately. Serves 4 to 6.

Variations are almost limitless. Stick to 1½ cups of whatever you wish to add—unless of course it is something like cayenne or a slivered white truffle. Grated cheese, cubed lobster, vegetable purées, flaked salmon—design!

This recipe easily becomes a dessert soufflé by adding a flavoring of your choice to the yolk mixture—leaving out the salt and pepper. Cool mixture slightly before beating the egg whites. Beat the egg whites as before, but only to *soft* peaks. Gradually add ½ cup sugar and continue beating until whites form stiff peaks. After buttering the souffle dish, dust it with sugar.

Liqueurs, lemon (½ cup juice and 1 Tablespoon lemon rind), melted unsweetened chocolate, and a dash of mint liqueur are wonderful. A sauce of melted ice cream with a little whipped cream added should top a dessert soufle.



I defy anyone to think of eggs without also thinking of some marvelous meringue-topped dessert. But *why* do egg whites stiffen when they are beaten? Why does excessive beating separate water from the whites and ruin the meringue? Why does the addition of a mild acid such as vingar (acetic acid) or cream of tartar (tartaric acid) strengthen the whites? Why is salt undesirable if it is added before the whites are beaten? Last, why is superfine sugar preferable?

The major reason for a cook to care is that the answers affect the product; besides, I would hope our natural curiosity becomes aroused. Protein is involved in all the answers to the questions posed earlier. The success of the meringue depends on how protein behaves as it is affected during the preparation. Proteins are huge molecules consisting of a chain (or several chains) of amino acid units linked by peptide bonds. Those in egg whites go through perfect hell as the cook whips away.

The peptide bonds are weakened and part of the protein's structure is destroyed. This destruction is known as *denaturing*, and denaturing egg whites is the beginning of what is called a *gel*. Beaten air bubbles are trapped in a three-dimensional mesh; each is surrounded by a thin film of water.

Excessive beating ruins a meringue because it unravels the proteins to a point where the air bubbles collapse. If a recipe says "beat egg whites until stiff," beat no further. Otherwise those stiff peaks are unfortunately going to lead to a flat meringue. Too great a denaturing will have occurred. The water will no longer be capable of holding small air bubbles in the protein mesh.

When cream of tartar or vinegar is added (as in some recipes), the meringue is strengthened simply because the positive and negative charges in such a molecular mixture are attracted to each other. There is less negative net repulsion and the egg white proteins can more easily bind to make the required gel. If salt is added before the egg whites are beaten, it will help stiffen them but it can also make the meringue tough and elastic. This is because the salt crystals remove water. More than the smallest amount can cause a collapsed meringue.

Superfine sugar is preferable because it will dissolve more easily into the water walls surrounding the air bubbles. Undissolved sugar equals a "weeping" meringue. Some cooks sob over these polka dots of syrup, but others find them as attractive as they do jacaranda blossoms on their lawns. I leave it to you. I also leave you with a recipe for "Apple Amber," which is topped with meringue and is about as seductive as an apple pie can be.

APPLE AMBER

1½ pound cooking apples, peeled, cored, and chopped
2 to 4 Tablespoons sugar, according to taste
grated rind and juice of ½ lemon
2 Tablespoons butter
2 eggs, separated
Rich Shortcrust Pastry
¼ cup superfine sugar
apple slices, dipped in lemon juice, to decorate

Place apples, sugar, lemon rind, and juice, butter and one to two tablespoons of water in a saucepan. Cover and cook until the apples are a soft purée. Cool slightly, then beat in the egg yolks.

Preheat oven to 350 degrees. Roll out the pastry on a lightly floured board to form a circle large enough to line an eight-inch pie plate. Cut a strip of excess pastry and place around the rim of the pie plate. Dampen with water and ease the pastry circle into the plate, pressing the two edges of pastry firmly together. Cut away any excess pastry and use the trimmings to make small decorative shapes. Secure around the rim. Pour the apple mixture into the pastry-lined plate and bake for twenty to twenty-five minutes or until the pastry is golden and the apple mixture has set. Reduce the oven temperature to 300 degrees.

Beat the egg whites until stiff. Gradually beat in all but one tablespoon of the sugar until the mixture is thick and glossy. Spoon the meringue over the apple filling and dust with the remaining sugar. Bake for thirty minutes or until the meringue is golden and crisp.

Rich Shortcrust Pastry

¾ cup all-purpose flour
pinch salt
½ stick butter, plus 1 heaping teaspoon
1 small egg yolk
1 Tablespoon ice water

Sift flour and salt into bowl. Add the butter, cut into small pieces, and rub in with the fingertips until the mixture resembles fine bread crumbs. Add the egg yolk and ice water. Mix into a firm dough and chill for thirty minutes. Serves four to six.



This has been a mere scratching of the surface—as both roosters and hens are wont to do. As for the unanswered question, I expect the answer lies in nature. It is a vast world out there and under no obligation to reveal its secrets. I once read a story in which someone practiced a strange form of origami, and on the final folding, the entire piece of paper disappeared! Perhaps *both* the chicken and the egg came first if they came from wherever that piece of paper went....

William Breen describes himself as a former fashion designer who is currently involved in writing and illustrating, especially as they pertain to food and wine. He has a business in wild edible mushrooms and enjoys devising menus featuring exotic fungi.

CURATORS & COLLECTIONS

A Fossil Sperm Whale from Sherman Oaks. Dr. Samuel A. McLeod, of the Natural History Museum's section of Vertebrate Paleontology, recently excavated the fossil remains of a 10-million-year-old, 20-foot-long sperm whale discovered in a Sherman Oaks back yard.

Said Dr. McLeod of the find: "This fills in the gaps in the evolution of sperm whales and whales in general." The fossil teeth indicate that sperm whales have evolved a great deal over the last ten million years. For instance, the ancient whale had upper teeth as large and as fully developed as those in the lower jaws, whereas modern sperm whales have reduced upper teeth that are embedded in the gums and are not rooted in the skull.

These fossil remains were found in the Santa Monica Mountains, but the rocks forming those mountains were deposited in a part of the ocean that millions of years ago extended as far as what is now Pasadena, San Fernando, and Newhall and was hundreds of feet deep. The entire Los Angeles basin, including the mountains, has been raised above the ocean level since that time.

Sperm whale fossils are rare in local rock deposits, but they include a small tooth from Palos Verdes and the nearly complete skeleton of a 7-million-year-old baby sperm whale found in Orange County in 1982.

The remains of the Sherman Oaks sperm whale were initially discovered by Alison Epstein when she began planting azaleas for her back-yard wedding. A friend, Toby Cohantz, recognized that some of the rock being removed contained fossils and he brought the fossils to Dr. Lawrence G. Barnes, Section Head of Vertebrate Paleontology at the Museum. Doctors McLeod and Barnes knew immediately that the fragments were parts of a sperm whale. Mr. Cohantz and Dr. McLeod subsequently excavated the teeth, jaws, and much of the skull of this fossil sperm whale.

The recovery of this specimen generated extensive press coverage as Doctors McLeod and Barnes gave numerous interviews to the print and broadcast news media.

BOOK REVIEWS *(Continued from page 6)*

and seventeenth-century Netherlands. Woodward's contribution, entitled "The Manuscript, Engraved, and Typographic Traditions of Map Lettering," is the best of the six.

The general reader might find some of the essays occasionally heavy going—perhaps even pretentious—but even these are worth browsing through because of the wealth of information they contain about maps and art especially in sixteenth- and seventeenth-century Europe. This book is a valuable addition to the library of anyone interested in the history of cartography.

Dr. Errol Wayne Stevens
Associate Curator
Historic Records

THE GENIUS OF THE PEOPLE by Charles L. Mee, Jr., Harper and Row, 1986. Cloth, 348 pp., $19.95.

Amidst a spate of recent books commemorating the forging of the American Constitution, Charles Mee's account emerges as one of the most engaging. While the recent studies by Michael Kammen, Christopher and James Collier, and Forrest McDonald, among others, are more serious, Mee manages to capture the spirit of the events in Philadelphia in 1787 and present them in an interesting fashion. However, this study glosses over, and thus unintentionally trivializes, some of the fundamental issues confronted at the Constitutional Convention.

Mee is at his best in depicting the energetic dialogues of the Convention delegates. The verbal jousts between William Paterson and James Madison, James Mason and Charles Pinckney, and Edmund Jennings Randolph and Gouverneur Morris bring verve and excitement to this study. In fact, the lively journalistic style breathes new life into the usually dry concerns of political theory and constitutional law so characteristic of this period in American history.

Mee's adherence to chronology, however, diffuses the key issues that fueled the debates over the Constitution. A topical approach to the subjects of congressional power, slavery, the powers of the chief executive, and, especially, the large state–small state controversy, would have provided the analytical depth necessary for a full understanding of the work conducted that summer in Philadelphia.

Any complete discussion of the Constitutional Convention should consider *why* such a conference was deemed necessary. The instrument of government that guided the young republic from 1781 to 1788—the Articles of Confederation—is alluded to only briefly. This approach muddles a central aspect of the Convention: the attempt to improve the effectiveness of federal authority provided in the Articles. An appreciation of the major discussions and the political opinions permeating the Convention sessions hinges on understanding the deep antagonism felt by numerous republican "localists" toward a framework of law that would unquestionably diminish individual state power.

Mee's epilogue, sprinkled with a few anecdotes, is a mere retelling of the traditional story of gradual state ratification. More interesting are the "asides" presented by Mee on some of the seemingly minor problems encountered by the delegates that have turned into momentous twentieth-century issues; namely, the military complex and presidential power. However, final, tightly drawn treatment of these issues is lacking in *The Genius of the People.*

The easy journalistic style of this book—replete with engaging character sketches of lesser-known yet influential figures in early American history, such as Elbridge Gerry, William Paterson, and Luther Martin—adroitly conveys the atmosphere of late eighteenth-century America. Finally, in portraying the spirited dialogues of these great patriots and theoreticians, the author brilliantly probes the complexities of the political minds commingling in that sweltering summer of 1787. While arguing vigorously for their state, community, and personal interests, the delegates at Philadelphia labored primarily for *national* political solutions to the many vexing problems facing the young nation. This spirit that created the Constitution was aptly characteristic of an age unique in world history.

Dr. William L. Cumiford
Assistant Curator
Business and Industrial History

WHALES, ICE, AND MEN: THE HISTORY OF WHALING IN THE WESTERN ARCTIC by John R. Bockstoce, University of Washington Press, 1986. Cloth, 400 pp., illustrations, $29.95.

Whalers and sealers seeking new areas in which to pursue their prey led to the discovery and exploration of much of the Arctic and Antarctic. The whaling industry—focused on an Arctic species of whale, the bowhead, which had been hunted to extinction elsewhere in the Arctic—was sufficiently important that

during the Civil War, the Confederacy outfitted a few ships for the sole purpose of destroying Yankee whaleships, hoping by so doing to cripple the North's economy. In fact, the last hostile act of the war was perpetrated in the news-isolated Arctic by the Confederate ship *Shenandoah* six months after the war was over.

This well-written book, derived from research on numerous logbooks kept by the whaling ships as well as published works on whaling, chronicles the whaling industry in the western Arctic from 1848 to 1921. *Whales, Ice, and Men* provides detailed insight into this important American industry and its impact on the native people and the marine mammals on which they preyed. For example, the extensive over-hunting of walruses by whalemen beginning in the late 1860s was undoubtedly a major factor in the mass starvation of many Eskimos in the next decade. In addition, over the course of eighty years, more than 18,600 bowhead whales were killed, an overexploitation from which this species has yet to recover. The repercussions of this overhunting are still being felt: international disagreement today by scientists, conservationists, governments, and Eskimos over the continued native hunt of the endangered bowheads stems from the activities of American whalemen in the last century.

Dr. John E. Heyning
Assistant Curator
Mammalogy Section

LONGTIME CALIFORN' by Victor G. and Brett de Bary Nee, Stanford University Press, 1986. Paper, $11.95.

This book, first published in 1972, has become an important contribution to the literature on the Chinese in California. It has been used as supplemental reading in Asian Studies classes and is considered an outstanding work on the Chinese in California, particularly the Bay Area, between 1920 and 1970.

The core of this book is a series of oral interviews taken from about fifty people, which gives the text some life and character that are all too often lacking in accounts of Chinese life in the United States. Given the relative absence of individual life histories available in English on Chinese-American figures of the nineteenth century, this book may well have more value many years from now as some sort of clue to Chinese-American life during the mid-twentieth century.

A variety of subjects are covered within these selections: principally labor, especially in the garment industry and restaurants; the Ping Yuen Housing Project, an important complex within San Francisco's Chinatown; social unrest during the 1960s; familial structure and interaction; problems of refugees; and prospects for the future. Interestingly, there are few interviews with middle-aged Chinese Americans. This is to be regretted, as the entrepreneurial portion of the San Francisco Chinatown community is consequently underrepresented, especially if their economic and social clout are to be considered. It is entirely possible, and quite regrettable, that many persons of extremely conservative political viewpoint in Chinatown did not make themselves available for such interviews.

What is presented, despite the spottiness of age and occupation distribution, adds up to a valid and useful portrait of the inhabitants of San Francisco's Chinatown circa 1970. The book's historic value will be greater with time as the Chinatown of the 1960s becomes more significant to us in terms of the changes and stresses that affected the community during that decade.

William Mason
Curator
Military & Political History



"Grand ball given by the whales in honor of the discovery of the oil wells in Pennsylvania." Petroleum duplicated most mid-nineteenth-century uses for whale oil, but this discovery did not save the whales from being hunted to the point of near extinction. From Vanity Fair, *1861, as reproduced in* Whales, Ice, and Men *by John R. Bockstoce.*

LEONARDO DA VINCI ON PLANTS AND GARDENS



WILLIAM A. EMBODEN

Foreword by Carlo Pedretti

LEONARDO DA VINCI ON PLANTS AND GARDENS by William A. Emboden, Dioscorides Press (published in conjunction with the Armand Hammer Center for Leonardo Studies), 1987. Cloth, 219 pp., $34.95.

In the long history of Leonardo studies there has not been a comprehensive work dedicated to the botany of this great genius. As indicated by Professor Carlo Pedretti in his eloquent introduction to this study of the plants and gardens in the body of Leonardo's works, this book by William Emboden fulfills that niche both as a reference source for Renaissance scholars and as a book for the general reader. To appreciate the magnitude of this study, begun over twenty years ago in the Elmer Belt Library of Vincian Studies at UCLA, one needs to realize that Leonardo's drawings and references to plants and gardens are scattered throughout the thousands of pages of his notebooks. From the mass of fragmented thoughts, drawings, and dissertations, Dr. Emboden has assembled the first cohesive study of any magnitude.

We are amazed to find that Leonardo was often centuries ahead of his time in formulating basic ideas on plant hormones, root pressure, the elements of photosynthesis, sexuality in plants, and other concepts generally attributed to botanists of a much later date. Leonardo characterized himself as a "disciple of Nature." While he had recourse to the knowledge of the ancients, he always insisted on returning to nature for information, thus avoiding repeating others' errors. In this sense, as the author points out, Leonardo was not a typical Renaissance man.

From this book we also learn that

Leonardo was fascinated with the analogies existing between the seemingly disparate elements of nature. Dr. Emboden's frequent quotations from Leonardo's own writings present us with a man of extraordinary vision both in the area of the botanical sciences and the emerging concept of the Renaissance garden. How wonderful it would be to visit his ideal garden, with its aviaries, greenhouses of mica sheets, orangeries, mills blowing warm and moist air during the cold months, canals of fish, tables with water running down the center to cool the wines and carry exotic dishes, interwoven lattices of diverse plant species, and a water organ to play music through the falling water. Fortunately Leonardo did have the opportunity to participate in the architecture of some major edifices and their gardens in Italy and France. A few of the buildings remain, but unfortunately the gardens are lost to us except for their reconstruction in this book.

Mention is made in the text of this book of Leonardo having produced a now lost book on plant studies; this discourse in the area of botany would have been unique in its time. Given the insights in Emboden's book, we are left to speculate upon the possibility of one day finding such a lost manuscript.

Dr. Emboden, an active Research Associate in the Natural History Museum's Botany Section, was able to verify some of the plants represented by Leonardo through the use of the museum's Herbarium. The 100 illustrations in the text, together with ten images in color, assist the reader in comprehending the book's sometimes complicated text.

Robert Gustafson
Collections Manager
Botany Section

BOLD DRAGOON: THE LIFE OF J.E.B. STUART by Emory M. Thomas, Harper & Row, 1986. Cloth, $23.45.

Bold Dragoon is both an upbeat and depressing tale. Author Emory M. Thomas excels in tracing the theme of young James Ewell Brown (Jeb) Stuart's obsession with becoming a figure of some importance and how that mania led him to an untimely end.

Jeb Stuart was born in Virginia in 1833, and he passed his boyhood on the family plantation of Laurel Hill in southwestern Virginia. Following his graduation from West Point with the class of 1854, Lieutenant Stuart found himself assigned to a frontier garrison in west Texas. For a young officer who had come to fancy himself a "bold dragoon," it was a rather inauspicious beginning to a military career. But, as the author has noted, Stuart appears to have determined two things early in life: to miss no opportunity to experience life as fully as possible and to make the best out of whatever situation in which he found himself.

Astutely using his Southern connection to the fullest, Stuart soon convinced Secretary of War Jefferson Davis to transfer him to the elite First Cavalry unit stationed at Fort Leavenworth, Kansas Territory, in 1855. Within six months Stuart had courted and wed the daughter of the dragoon's regiment commander. Certainly Stuart had made the best of his situation thus far in his military career.

The secession of the South from the Union offered Stuart yet another opportunity—one that promised a much greater likelihood of rapid advancement than did years of gradual promotion in the U.S. Army. Claiming, as did many soldiers, that his first allegiance was to Virginia, Stuart soon found himself in the service of the Confederacy.

After repeated demonstrations of his skill as a cavalry commander, Stuart soon advanced to the rank of Major General with the responsibility for all of Robert E. Lee's mounted troops. Ultimately, however, Stuart's success would lead to his downfall. His belief that he and his troopers were invincible led Major General Stuart to treat the war as a game and to behave in a very lackadaisical manner. Partying with Southern belles and entertaining his staff became his top priority, and his effectiveness as a military commander seemed to decline accordingly. While Stuart's early, ambitious years make for inspiring reading, his lackluster final years make the reader want to wring his neck!

While trying desperately to rally his badly outnumbered forces at the battle of Yellow Tavern, Virginia, in 1864, Stuart received a wound that proved to be fatal. He died on May 12, 1864, shortly after those who were with him sang the hymn "Rock of Ages." Jeb Stuart's short life had been one of glory and tragedy. As Thomas observes in his conclusion, "Stuart's triumph as a person lay in his success at acting out his vision of himself." Yet it was also in his attempt to play the role of warrior, knight, and cavalier that Jeb Stuart tarnished his image as an undefeatable enemy. Civil War buffs will enjoy *Bold Dragoon* and appreciate Emory Thomas's successful effort to breathe life into this almost-mythical Southern cavalryman.

Dr. M. Guy Bishop
Assistant Curator
Social History

In reference to the May/June 1987 issue and the article by William Breen, I take exception to the derivation of the term *cos romaine* or, more generally, *cos lettuce.*

I cannot accept the explanation that the Romans called it *cos* because it resembled a spoon (or could be used as we use spoons today). *Cos,* in classical Latin, meant a grindstone, not a spoon. The word for spoon was the Greek word *cochlear,* meaning a shell (sea shell). Since anything shaped like the metallic spoon of our day was not known in Roman times, the Romans used sea shells as spoons to scoop up liquid or semiliquid foods.

So where did the word cos lettuce come from? From the Greek island of Kos, or Koos, or Cos—of cos! It is located in the southeastern part of the Aegean; its Greek spelling requires a long O, not a short one. But in English we pronounce it cos.

Cos lettuce was well known in Britain. Alexander Pope wrote to a friend in 1726 that he "had had dinner with Lady Suffolk at Marble Hill, and the dinner included the lettuce of a Greek island called Cos." And in 1741 George Berkeley, who had recently married Lady Suffolk, wrote loyally that he "ate of a salad composed of cos-lettuce as fine as can grow, except at Marble Hill," the latter place being the Twickenham estate of his new wife, who liked to indulge in vegetable growing.

You may find other references to cos lettuce in the Oxford English Dictionary, which cites several other writers, and defines it as "a variety of lettuce introduced from the island of Cos."

So I really don't think anyone could claim that it was so named by the Romans because its leaves could be used for spooning up hemlock!

Raymund F. Wood
Encino, CA

TERRA welcomes letters from its readers on articles we've published and articles you might like to see—we are very interested in hearing what you have to say and value your input. Please send letters to TERRA Editor, Publications Office, Natural History Museum, 900 Exposition Boulevard, Los Angeles, CA 90007.

Erratum

Several paragraphs were inadvertently omitted from "Radiant Darkness: The Many Facets of the Caves of Jackson's Bay, Jamaica" by Donald A. McFarlane (TERRA, July/August 1987). Many of you called this mishap to our attention; to those of you who are still in suspense and would like a copy of the missing material, please let us know at the address above.

A Unique Museum Reproduction



Casts of an adult saber-toothed cat skull are for sale at the George C. Page Museum Shop. The saber-toothed cat, *Smilodon californicus*, is the California state fossil. This lion-size carnivore lived during the last Ice Age and became extinct about 10,000 years ago. Many hundreds of *Smilodon* specimens have been recovered from the Rancho La Brea asphalt deposits (tar pits) in Hancock Park. Our reproduction is cast from a real skull and is made of hand-painted resin mounted on a wooden base. This unusual item is priced at $225. Other Ice Age mammal fossil reproductions are available, and mail and telephone orders will be accepted.

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